DOCUMENT RESUME

ED 462 931 IR 021 089

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TITLE	From Mythology to Technology: Sisyphus Makes the Leap To Learn.
PUB DATE	2001-06-00
NOTE	7p.; In: Building on the Future. NECC 2001: National Educational Computing Conference Proceedings (22nd, Chicago, IL, June 25-27, 2001); see IR 021 087.
AVAILABLE FROM	For full text: http://confreg.uoregon.edu/necc2001/program/.
PUB TYPE	Reports - Evaluative (142) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	*Computer Uses in Education; Constructivism (Learning); *Educational Technology; Elementary Secondary Education; *Faculty Development; Higher Education; *Instructional Design; Learning Strategies; Partnerships in Education; Rural Areas; Teacher Workshops; *Teaching Models; *Training; Web Based Instruction
IDENTIFIERS	*Technology Utilization

ABSTRACT

A five-year U.S. Department of Education Technology Innovation Challenge Grant, the NatureShift! Linking Learning to Life project was awarded in 1997 to the partnership of Dakota Science Center and the Grand Forks Public Schools (North Dakota). It was designed with partners from the Sahnish Cultural Society and the University of North Dakota to take technology and hands-on learning to an information-isolated highway of communities, including public schools, tribal schools, parks, museums and libraries. It soon became a true test of mettle for learners, educators, community volunteers, and instructional designers alike. This paper discusses lessons learned from the project's first three years of training educators in the application of the NatureShift Exploration Model, a teaching and learning strategy that borrows heavily from informal education, formal education, and instructional technology. The model establishes a standard for teaching and learning with technology derived from constructivist, inquiry-based educational theory and practice. As a professional development and learning tool, the model proved as difficult to teach as the new technologies it used. It soon proved its value, however, once trainers stopped teaching it and began using it to teach. Likewise, the findings of the project have shown that teaching new technology works more effectively when educators are not taught the technology but rather are given opportunities to use it to do what they do best--teach. (Author/MES)

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Key Words: Professional Development, Web Instruction, Technology Training, Instructional Technology, Constructivist

Abstract

Making the leap to a technology-enhanced, online educational experience has been a four-year labor of love as well as a steep learning curve for the *NatureShift! Linking Learning to Life* project. A five-year U.S. Department of Education Technology Innovation Challenge Grant (TICG), the *NatureShift (NS)* project was awarded in 1997 to the partnership of Dakota Science Center and the Grand Forks Public Schools. It was designed with partners from the Sahnish Cultural Society and the University of North Dakota to take technology and hands-on learning to an information-isolated highway of communities including public schools, tribal schools, parks, museums and libraries. It soon became a true test of mettle for learners, educators, community volunteers, and instructional designers alike. This paper will discuss lessons learned from the project's first three years of training educators in the application of the *NatureShift* Exploration Model, a teaching and learning strategy that borrows heavily from informal education, formal education and instructional technology. The model establishes a standard for teaching and learning with technology derived from constructivist, inquiry-based educational theory and practice. As a professional development and learning tool, the model proved as difficult to teach as the new technologies it used. It soon proved its value, however, once trainers stopped teaching it and began using it to teach. Likewise, the findings of the project have shown that teaching new technology works more effectively when educators are not taught the technology but rather are given opportunities to use it to do what they do best—teach.

Pedagogy

The computer and the Internet have radically changed the face of traditional educational technologies and with their introduction into education these new tools have also affected what we understand about teaching and learning. The computer crept slowly into education in the mid-twentieth century, at first for machine-like conversations with humans that mimicked the lock-step

robots of the assembly line, computers were for "programmed instruction"[1] (Goldsworthy 2000, Skinner 1958). Eventually, however, computing peppered the landscape of learning and tossed in its own instructional rules into the process that suggested technology could aide learners in constructing meaning from the learning process (Harper *et al.*, 2000). The recognition of ways technology gives learners control over much of the learning environment challenged the educator's traditional role. The ability of the learner to interact with the content, to reorder it, reshape it, or question it, at his or her discretion meant that educators had to revise their most core concepts of teaching, relearning how to shape an instructional experience in this new environment (NCES, 1999). This landscape required multidimensional as well as multimedia construction (Havinga 2000). Not only was a teacher faced with the challenge of framing a lesson plan according to new principles, they had to design instruction that could be delivered through this foreign medium of technology and learn new rules of engagement—to understand how students interacted with technology for learning (Elkind 2000).

The use of the new technologies in framing instruction, first the computer and later the Internet, gave the learner freedom to create personal learning goals and eventually build new learning constructs. However, these glamorous new tools quickly developed their own mythology. The computer, the digital camera, the informational technologies of the Internet solicited more interest than the work they were created to do. Learning got lost in the glamour. These new technologies also came with learning curves. Educators either embraced them as exciting challenges or evaded them as impediments to the instructional process. *NatureShift* was designed to employ and infuse new technologies into its model and its methods. Its mandate to bring technology and its training to educators from the vastly different worlds of formal classroom education and informal free-choice educational settings was a monumental goal. *NatureShift* was faced with a double-edge challenge: to train educators in the use of new technologies and, at the same time, in a new model for teaching and learning with technology. What the project discovered early was that professional development for educators required debunking the technology myths that impeded learning new methods and practices.

Importance of the Study

New national technology standards for students and teachers coming out of ISTE[2] as well as other organizations are being accepted nationally by accreditation organizations such as NCATE[3]. These have raised the bar for pre-service teacher education and are rapidly pressuring for adoption of higher technology standards by public schools nationwide. The educational community is being asked to increase technology access and implement rigorous technology profiles throughout its schools and universities even as it struggles with implementing best approaches to training its educators. Add to the picture a technological landscape that keeps growing and changing and the importance of successful training methods becomes paramount. The *NatureShift* experience has shown that the challenge for training in-service as well as pre-service teachers and informal educators is indeed great and there is not an easy answer. Nevertheless, we have seen trends that suggest there are rules that work in this new landscape. One finding of particular note has been the discovery that differences in training needs and technology skills could be surmounted by concentrating training on using technology to accomplish tasks that are known. By modeling technology use, empowering teacher-learners to put hands on the technology, and integrating the technology with meaningful tasks clearly worked during training.

[1] Programmed Instruction, a term referring to drill and response instructional exercises programmed into early computers with feedback stamped out on punch cards. Learners performed drills until they mastered the content. The practice was introduced to education during the 1950s when B.F. Skinner's *stimulus and response* educational theory was at its height.
[2] International Society for Technology in Education
[3] National Council for Accreditation of Teacher Education

The *NatureShift* Challenge

The *NatureShift* project has 10 pilot site partners who implement the *NatureShift* "Exploration Model" using curricular content from five cross-disciplinary education modules. Five pilot sites are formal school environments, and five are informal (or free-choice) educational environments (parks, libraries, and museums). The project provides professional development in the model and the technologies to educators at all sites. At the start of the project, *NS* educators approached professional development using known methods of training. Those methods included trainer-to-trainee instruction and hands-on activities to learn the technologies (computer hardware, educational software, scanners, QTVR production, and video camera). Teachers were given specific tasks to learn the technologies and then specific tasks to learn the ingredients of the model, all new content for teachers to learn but doing so using instructional practices that were very familiar. This approach quickly introduced educators to new technology. Teachers learned to use the video camera and they were thrilled. Sometimes they learned effective strategies to integrate the camera into their instruction. The same for learning the computer and other new technologies. Practice in creating technology-enhanced instruction that followed the precepts of the *NS* model met with the same results. Teachers learned to set-up a lesson by Engaging students with an authentic situation or task. They built Web Adventures so their students could learn how to research using the Internet. They loved learning to construct Real World Adventures that put meaning into students' understandings. They learned to design multimedia projects or portfolios that taught their students to construct meaning from their learning. Yet, after every *NS* site training or conference workshop, participants failed to retain most of the knowledge they had gained. Worse yet, trainees had more problems when they returned to their sites. Either the technology failed or they could not remember how it worked, and they had no time to redesign curriculum or even a lesson plan that incorporated new technology. If they did not get enough training at the workshop, the technology did not get used.

By the start of the grant's third year, the project was faced with a dilemma. Staff was modeling new technologies. They were modeling innovative teaching and learning strategies. Yet, knowledge was not being retained. Teachers did not remember the technology at follow-up workshops, nor were they demonstrating any ability to transfer knowledge gained to new situations. At partner workshop after workshop, the same questions and issues arose. "Technology is too hard to learn.... It always breaks down.... I don't have time in my day to do all this creative planning... I can't teach students to use a technology I don't understand... I don't know what I'm supposed to do with this technology."[4]

Lessons Learned

In year three of the grant, the project changed course. *NatureShift* sponsors several workshops throughout the year, including two professional development workshops for partners. Each workshop and training includes surveys and self-assessments for participants to evaluate their learning. Although a formal statistical analysis of data will not be completed for another year, an anecdotal review of participant comments, taken in fall, 1999 revealed a common response. Participants were asking for *application* training. They wanted to know *how* to apply the *NatureShift* model, not how to use technology to implement the model. In response, the project tested a new training approach during its January 2000 workshop.

Partners were given the task to create the Web pages that would represent their work on the *NatureShift* Web site. Only 10 percent of partners knew anything about creating Web pages. They had not retained lessons in how to capture images and most had not learned to use photo manipulation software. They were not promised any training in technology but a voluntary technology lab was put at their disposal for practicing any of the technologies they wished to learn. Ninety percent of workshop participants availed themselves of the technology lab. Evaluation

[4] Compiled data from *NS* Summer Institute and Winter Workshop "Exit Questionnaires," 1998-2000.

comments at the close of the workshop revealed nearly 95% satisfaction with the workshop. Several evaluation comments clearly indicated educators felt they learned a great deal of technology as well as a new appreciation for Web-based instruction. Yet, no targeted technology training had been used during the workshop! Participant knowledge of technology was addressed on an individual basis during production.

The positive results of the Winter Workshop provided insight in designing the weeklong Summer Institute of July, 2000. Although not yet tabulated, cursory results from the Institute clearly indicate that using project-based instruction is much better at overcoming the technology learning curve than drilling in skills or putting technology in an educator's face and hoping they will overcome their preconceptions about it. At the Institute, partners were asked to design a *NatureShift* Exploration that would meet a curriculum need in their classroom. They were told their Exploration would have to be evaluated and would go up on the *NatureShift* Web site. Again, there was no focus on learning technology, although new technology instruction was offered in audio production, video production, Inspiration software, and digital cameras. Teachers had to use cameras to record events at the Institute. They had to use Inspiration to present their curriculum concept, and they had to learn how to work in a networked environment on the computer. They were given plenty of time to work on their tasks. The results were more stunning. When partners returned home, they remembered how to logon to the *NS* server and transfer files. They complained when they did not have the latest technology because they already had plans for its use. Half of the partners had begun and even finished their *NS* project the following fall before staff had inquired into their progress. The basis of the *NatureShift* model is to build critical thinking and engage learners in problem-solving and inquiry-learning. It outlines a method for teaching that, when used for professional development has begun to prove its worth. The true test came when partners were asked to present their *NS* work and the ways they had found the project to be helpful. Presentations ranged from PowerPoint to posterboard. In each case, a clear confidence and appreciation of technology was evident. Projects reflected the clear value and place that technology would hold in their lifelong learning.

Evaluation Methods

The sources of data for this study include evaluations completed by partners, outside workshop participants, and preservice teacher candidates enrolled in the *NatureShift* elementary education technology course at the University of North Dakota. Except for outside workshop participants, teacher candidates and partners all completed post evaluations of each training session. In addition, anecdotal data was collected at every course. Evaluation and survey instruments have not been validated, but were created by the project internal evaluators and have been consistently applied during the life of the project. The project's external evaluators will conduct statistical analysis of the data. Each pilot site educator is currently required to create a complete *NatureShift* Exploration, including all pedagogical stages of the model. During the final year of the project, educators will be required to conduct an evaluated test of their *NatureShift* Exploration in one of their classes or with selected students. The Exploration model requires students to process what they have learned and thought in a summative project. The student projects from an educator's Exploration will be evaluated for evidence of knowledge acquired and critical thinking. Evaluations will consist of a teacher assessment rubric, student assessment rubric and evaluator assessment of project content. The external evaluation team will provide the rubrics. The team will also evaluate student projects for evidence of critical thinking and knowledge acquisition. If partner educators have acquired skills with technology and grasped an understanding of how students learn by using different technologies, their Exploration projects will reveal the clearest evidence of that knowledge.

Summary

The myths of technology create strong impediments to understanding it. What are some of the typical myths that crop up and blur our vision? "Technology is fun! Students will be engaged just because we use it. Technology IS the curriculum. Technology is too difficult to learn. Technology is easy. Creative planning for technology takes a long time. Technology makes teaching better, more productive. Technology always breaks down." (*NatureShift* Project, Annual Reports of Progress). In some instances any one of these myths might be true. Yet it is the resulting attitude that colors our approach to learning. What *NatureShift* discovered is that educators come to a workshop with their myths embedded deeply to remain even after training has taught them differently. The most effective method the project has found to overcome the mountain of resistance or misconception is to remove the mountain from view. Give the learner the task of putting one foot in front of the other and the mountain is easily crossed because attention is diverted to territory that is understood. Give teachers an instructional task and they will learn technology like they learned to write on the blackboard, without little thought of the chalk in their hand.

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